
(12) UK Patent Application (19) GB (11) 2 070 046 A

(21) Application No 8105255

(22) Date of filing 19 Feb 1981

(30) Priority data

(31) 55/021172

(32) 22 Feb 1980

(33) Japan (JP)

(43) Application published

3 Sep 1981

(51) INT CL³

C08L 51/00 C09K 3/18

(52) Domestic classification

C3V CX

C3M 145 145B 146 146B

147D 148 149 149B 153B

153D 154B 155 XC

C3W 111 205 205D 206

213D 215 215B 221 225

225B 225D

C3Y B262 B263 B270

B500 H440

(56) Documents cited

GB 2031449A

GB 1335685

GB 1078365

(58) Field of search

C3K

C3V

(71) Applicants

Kureha Kagaku Kogyo

Kabushiki Kaisha, 9-11,

Nihonbashi Horidome-cho,

1-chome, Chuo-ku,

Tokyo-to, Japan

(72) Inventors

Akio Kobayashi,

Takayuki Katto

(74) Agents

Elkington & Fife, High

Holborn House, 52/54

High Holborn, London

WC1V 6SH

(54) Antistatic resin composition

(57) The composition comprises (1) a graft copolymer obtained by graft-polymerizing an ethylenically unsaturated monomer onto a rubber trunk polymer which comprises units of (a) a polyalkylene oxide monomer comprising 4 to 500 alkylene oxide groups and ethylenic unsaturation,

and (b) a conjugated diene and/or an alkyl acrylate; and (2) an anionic surfactant. The graft copolymer may optionally be blended with another thermoplastic resin. The composition possesses an excellent and permanent antistatic property that is not lowered by washing or wiping as is the case with conventional antistatic resins comprising an antistatic agent.

TABLE 12

Example No.	Monomer composition (wt. %)						Half-life of charged voltage (sec.)	
	Rubber trunk polymer			Branch polymer			Untreated	Washed with water
31	But 7	OA 9	M3 4	MMA 80	NOM 0.64		0.8	0.9
32	But 7	OA 9	M4 4	MMA 80	NOM 0.64		0.9	0.8

Note: M3 polyethylene glycol acrylate
(having an average of 23 ethylene oxide groups)

M4 methoxypolyethylene glycol acrylamide
(having an average of 15 ethylene oxide groups)

EXAMPLES 33 AND 34

Test specimens were prepared substantially as in Example 23 except that the monomer composition of the graft copolymer was modified as shown in Table 13.

The results of the measurement of the half-life of the charged voltage by means of the Static Honest Meter are listed in Table 13.

TABLE 13

Example No.	Monomer composition (wt. %)						Half-life of charged voltage (sec.)	
	Rubber trunk polymer			Branch polymer			Untreated	Washed with water
33	But 22	BA 30	M5 13	MMA 33	BA 2	NOM 0.28	0.7	0.8
34	But 22	OA 30	M6 13	MMA 33	OA 2	NOM 0.28	0.8	0.7

Note: M5 ethoxypolyethylene glycol acrylate
(having an average of 15 ethylene oxide groups)

M6 ethoxypolyethylene glycol methacrylamide
(having an average of 23 ethylene oxide groups)

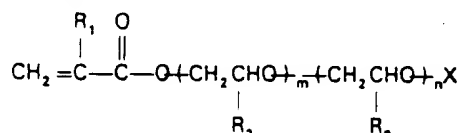
CLAIMS

1. An antistatic resin composition comprising:

- (1) 100 parts of a base resin; and
- (2) 0.1 to 5 parts of an anionic surfactant, said base resin comprising
 - (A) 7 to 100 parts of a graft copolymer obtained by graft-polymerizing 5 to 95% of at least one ethylenically unsaturated monomer onto 5 to 95% of a rubber trunk polymer which in turn is a copolymer of
 - (i) 30 to 90% of an elasticity-imparting monomer selected from the group consisting of conjugated dienes, alkyl acrylates and mixtures thereof,
 - (ii) 10 to 70% of a polyalkylene oxide monomer which is a monomer comprising 4 to 500 alkylene oxide groups together with an ethylenic unsaturation, and
 - (iii) 0 to 50% of at least one ethylenically unsaturated monomer copolymerizable with the elasticity-imparting monomer, and
 - (B) 0 to 93 parts of a thermoplastic resin compatible with said graft copolymer (A), said rubber trunk polymer being 5 to 80% of the total of the graft copolymer (A) and the thermoplastic resin (B), all quantities expressed in parts and percentages being by weight.

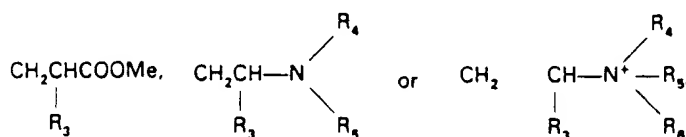
2. An antistatic resin composition as claimed in claim 1, wherein the anionic surfactant is a salt selected from the group consisting of dialkyl sulfosuccinate salts, alkylbenzene sulfonates, fatty acid salts, alkyl sulfate salts, alkylsulfonates, alkyl naphthalenesulfonates, phosphate salts, ethyl sulfo-fatty carboxylate salts, fatty alcohol sulfate salts, polyoxyethylene alkyl phenol ether sulfate salts and phosphate salts, polyoxyethylene alkyl ether sulfate salts and phosphate salts, and polyoxyethylene phosphate salts.

3. An antistatic resin composition as claimed in claim 1 or 2, wherein the polyethylene oxide monomer is represented by the formula:



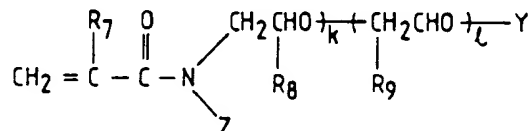
10 wherein

each of R_1 , R_2 and R_3 is hydrogen or an alkyl group having 1 to 4 carbon atoms; X is hydrogen, an alkyl group having 1 to 9 carbon atoms, a phenyl group, SO_3Me , SO_2Me , PO_3Me_2 .



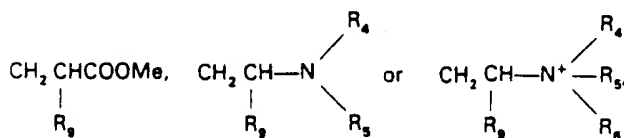
- 15 each of R_4 , R_5 and R_6 being hydrogen or an alkyl group having 1 to 9 carbon atoms, and Me being hydrogen, Na, Li or K; and m and n are integers that meet the requirement $4 \leq m + n \leq 500$.

4. An antistatic resin composition as claimed in claim 1 or 2, wherein the polyalkylene oxide monomer is represented by the formula:

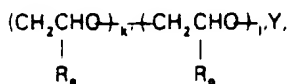


wherein

- 20 each of R_7 , R_8 and R_9 is hydrogen or an alkyl group having 1 to 4 carbon atoms; Y is hydrogen, an alkyl group having 1 to 9 carbon atoms, a phenyl group, SO_3Me , SO_2Me , PO_3Me_2 .

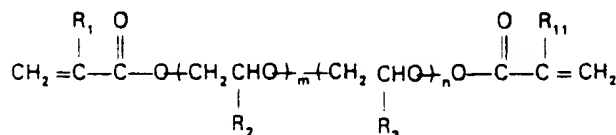


- 25 each of R_4 , R_5 and R_6 being hydrogen or an alkyl group having 1 to 9 carbon atoms, and Me being hydrogen, Na, Li or K; and Z is hydrogen, an alkyl group having 1 to 40 carbon atoms, a cycloalkyl group having 3 to 6 carbon atoms, a phenyl group, or



k and l being integers that meet the requirement $4 \leq k + l \leq 500$, and k' and l' being integers that meet the requirement $4 \leq \text{k}' + \text{l}' \leq 500$.

- 30 5. An antistatic resin composition as claimed in claim 1, wherein the polyalkylene oxide monomer is represented by the formula:



wherein

each of R_1 , R_2 , R_3 and R_{11} is hydrogen or an alkyl group having 1 to 4 carbon atoms; and m and n are integers that meet the requirement $4 \leq m + n \leq 500$.

6. An antistatic resin composition as claimed in any of claims 1 through 5, wherein the polyalkylene oxide monomer comprises a polyethylene oxide block consisting of 4 or more ethylene oxide groups.

5 7. An antistatic resin composition as claimed in claim 6, wherein the alkylene oxide groups in the polyalkylene oxide monomer consist of ethylene oxide groups. 5

8. An antistatic resin composition as claimed in any of claims 1 through 7, wherein the polyalkylene oxide monomer comprises 6 to 50 alkylene oxide groups.

9. An antistatic resin composition as claimed in any of claims 1 through 8, wherein the composition comprises 100 parts of the base resin and 0.2 to 5 parts of the anionic surfactant, said 10 base resin comprising 10 to 100 parts of said graft copolymer (A) obtained by graft-polymerizing 20 to 92% of said at least one ethylenically unsaturated monomer onto 8 to 80% of said rubber trunk polymer which in turn is a copolymer of (i) 50 to 90% of said elasticity-imparting monomer, (ii) 10 to 50% of said polyalkylene oxide monomer, and (iii) 0 to 50% of said at least one ethylenically unsaturated monomer; 10 and 0 to 90 parts of said thermoplastic resin (B), said rubber trunk polymer being 5 to 60% of the total of the graft copolymer (A) and the thermoplastic resin (B). 15

10. An antistatic resin composition as claimed in claim 1, substantially as hereinbefore described with reference to any of the Examples.